

(A)

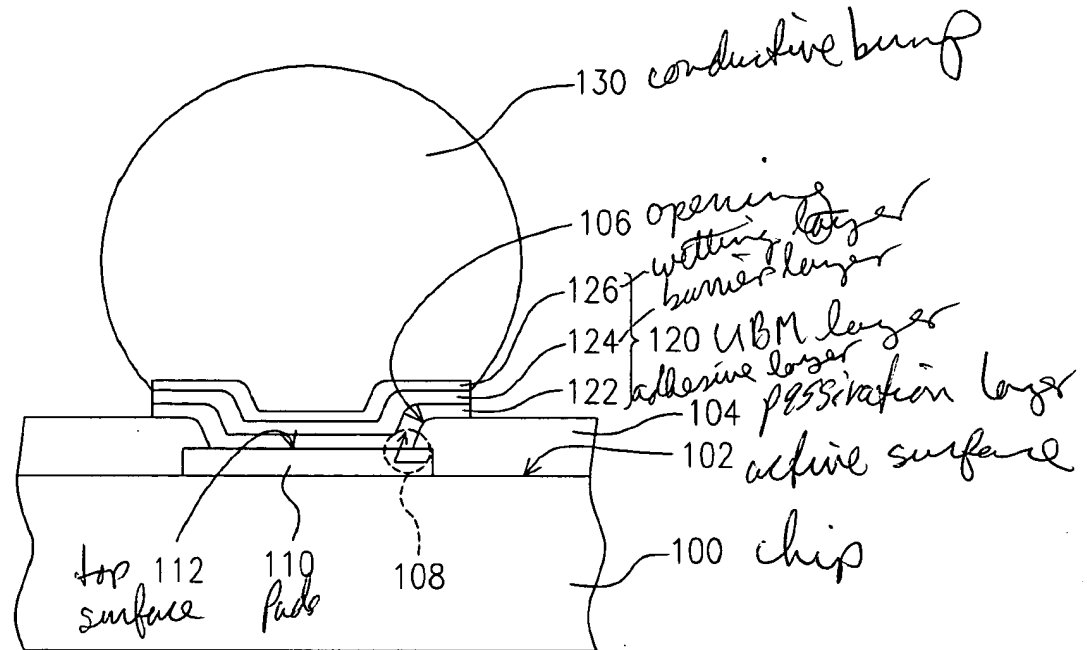


FIG. 1 (PRIOR ART)

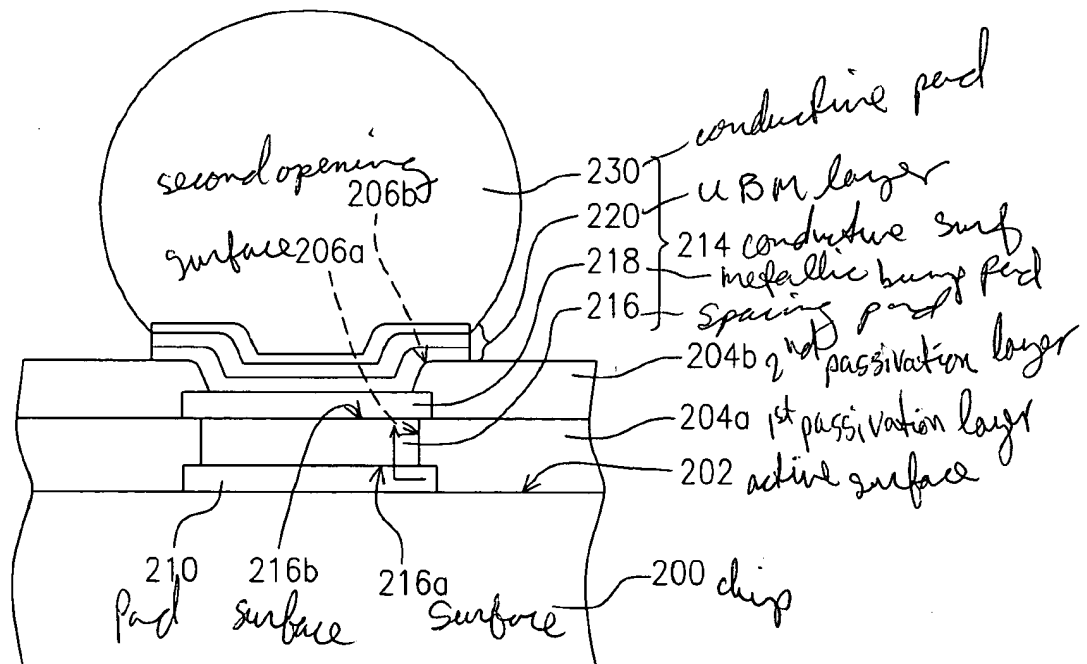


FIG. 2

(B)



US006815327B2

(12) **United States Patent**
Farnworth

(10) Patent No.: **US 6,815,327 B2**
(45) Date of Patent: **Nov. 9, 2004**

(54) **MASK REPATTERN PROCESS**

(75) Inventor: **Warren M. Farnworth, Nampa, ID (US)**

(73) Assignee: **Micron Technology, Inc., Boise, ID (US)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/423,240**

(22) Filed: **Apr. 25, 2003**

(65) **Prior Publication Data**

US 2003/0194854 A1 Oct. 16, 2003

Related U.S. Application Data

(63) Continuation of application No. 10/017,419, filed on Dec. 12, 2001, now Pat. No. 6,555,460, which is a continuation of application No. 09/754,671, filed on Jan. 4, 2001, now Pat. No. 6,365,501, which is a continuation of application No. 09/464,988, filed on Dec. 16, 1999, now Pat. No. 6,211,052, which is a continuation of application No. 09/179,310, filed on Oct. 27, 1998, now Pat. No. 6,083,820, which is a continuation of application No. 08/767,162, filed on Dec. 16, 1996, now Pat. No. 5,851,911, which is a continuation-in-part of application No. 08/612,059, filed on Mar. 7, 1996, now Pat. No. 6,072,236, and a continuation-in-part of application No. 08/682,141, filed on Jul. 17, 1996, now Pat. No. 5,736,456.

(51) Int. Cl.⁷ **H01L 21/44**
(52) U.S. Cl. **438/614; 438/640**
(58) Field of Search **438/614, 622, 438/637, 640**

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,761,782 A 9/1973 Youmans
4,074,342 A 2/1978 Honn et al.
4,360,142 A 11/1982 Carpenter et al.
4,670,770 A 6/1987 Tai
4,709,468 A 12/1987 Wilson

4,829,014 A 5/1989 Yerman
4,890,157 A 12/1989 Wilson
4,906,341 A 3/1990 Yamakawa et al.
4,948,754 A 8/1990 Kondo et al.
5,106,461 A 4/1992 Volfson et al.
5,137,845 A 8/1992 Lochon et al.
5,198,684 A 3/1993 Sudo
5,219,117 A 6/1993 Lin
5,224,265 A 7/1993 Dux et al.
5,246,880 A 9/1993 Reece et al.
5,293,006 A 3/1994 Yung
5,327,013 A 7/1994 Moore et al.
5,341,946 A 8/1994 Vaillencourt et al.
5,404,265 A 4/1995 Moresco et al.
5,436,411 A 7/1995 Pasch
5,470,787 A 11/1995 Greer
5,480,835 A 1/1996 Carney et al.
5,502,002 A 3/1996 Wong et al.
5,505,366 A 4/1996 Nishi et al.
5,604,379 A 2/1997 Mori
5,677,576 A 10/1997 Akagawa
5,719,448 A 2/1998 Ichikawa
5,736,456 A 4/1998 Akram
5,851,911 A * 12/1998 Farnworth 438/614
6,083,820 A 7/2000 Farnworth
6,147,413 A 11/2000 Farnworth
6,181,010 B1 1/2001 Nozawa
6,198,169 B1 3/2001 Kobayashi et al.
6,211,052 B1 4/2001 Farnworth
6,232,666 B1 5/2001 Corisis et al.
6,287,893 B1 9/2001 Elenius et al.
6,316,839 B1 11/2001 Farnworth
6,329,608 B1 12/2001 Rinne et al.

(List continued on next page.)

Primary Examiner--Kevin M. Picardat
(74) Attorney, Agent, or Firm--TrackBritt

(57) **ABSTRACT**

The present invention relates to an improved method for forming a UBM pad and solder bump connection for a flip-chip which eliminates at least two mask steps required in standard UBM pad forming processes when repatterning the bond pad locations.

15 Claims, 6 Drawing Sheets

